

PAINTBALL MUNITION CHAMBER AND PAINTBALL GUN UTILIZING THE SAME

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FIELD OF THE INVENTION

This invention relates generally to paintball guns. More specifically, the invention relates
5 to a method and apparatus for a hopper holding the paintballs to be fired from a paintball gun.
The current invention is a lower profile hopper essentially fitting into the form of the gun and
may be either a retrofit to current paintball gun designs, or it may be integrated into the gun at the
time of manufacture.

BACKGROUND OF THE INVENTION

10 Paintball sporting has grown in popularity as a form of recreation over the last 20 years. The game is a form of simulated combat and typically uses gas powered guns which are capable of propelling marker dye filled gelatinous balls approximately .68" in diameter at speeds around 290 feet per second. These paintballs rupture when striking an object, leaving the object marked by the dye contents. The paintballs are fired at opponents, and any person hit by a paintball that
15 ruptures will experience an identifiable mark and be put out of the game. If the mark is on the gun, or anything else carried or worn by the opponent, the opponent is also out of the game. If an opponent is hit by a paintball that does not rupture and leave a paint mark, that opponent is not out. Therefore, as to the paintball itself, there is a balance that must be struck for a paintball that can be handled and loaded into the breech of a gun and accelerated suddenly without rupturing,
20 and yet will rupture on impact at the target.

Over time, paintball guns have become more and more sophisticated, developing to

include semi-automatic and automatic models. These models can use a significant quantity of paintballs in a short period of time during the course of a game. To accommodate this rate of paintball usage, hoppers were developed which attach to the gun near its breech, hold a substantial number of paintballs, and feed the gun. The guns themselves are not particularly large and the typical hopper can add significantly to the profile that the overall assembly presents.

25 Although the hopper is effective for storing quantities of paintballs, it can also increase the size of target presented by the user. A large hopper also detracts significantly from the appearance of the gun. In general, most paintball enthusiasts prefer a paintball gun that comes as close as possible to the appearance of a semi-automatic weapon in order to bolster the ambiance of the

30 game.

DESCRIPTION OF THE RELATED ART

Paintball hoppers and loading mechanisms have previously been found in a number of prior art patents. U.S. Patent 5,097,816 by Miller shows an early approach to holding a sufficient quantity of paint balls for automated firing. A cannister attaches to the gun above the breech. Gravity conducts the balls down a spiral track in the cannister which is filled from a port in its top. The single file spiral prevents jams which can interrupt the flow of paintballs and put a player at a disadvantage until the proper flow is re-established.

A simpler, and probably the most common type of paintball hopper is seen in U.S. Patent 40 5,166,457 by Lorenzetti. The Lorenzetti hopper is oriented above the breech and has a generally curved bottom directing the paint balls to a tube leading to the breech. The illustrations in the Lorenzetti patent do not necessarily represent the actual size relationship between the hoppers and guns. Typically, the hopper appears much larger in relation to the gun than shown by

Lorenzetti. Any jams may be cleared by shaking the gun and hopper assembly. Several

45 inventions in this field relate to means of preventing jams in hoppers of this type.

Perhaps the patent most relevant to the present invention is U.S. Patent 5,954,042 by Harvey. Harvey solves the problem of a high profile gravity feed hopper located above the gun barrel by placing a large hopper below the gun barrel and forward of the trigger. The paintballs are fed part way up to the breech via a powered paddle wheel. The paintballs are driven through
50 a tube the remainder of the distance to the breech by the pressure of paintballs fed by the paddle wheel into the stack in the tube. An electrical motor, overload circuit, spring, and one way clutch keep the paddle wheel biased toward feeding paintballs, but not necessarily constantly turning. Harvey provides one solution that is adaptable to current paintball gun models, but it is also more complex than the gravity feed hoppers, and uses mechanical manipulation of the paintballs to
55 feed the gun. This may increase the likelihood of damaging the paintballs.

Another approach is illustrated in a series of patents by Kostopoulos, U.S. Patents 6,305,367; 6,467,473 and 6,488,019. In all of the patents, Fig.'s 3 - 5C show aspects of a hopper mounted along side of and below the barrel of the paintball gun. Conveyors in the bottom of the hopper move the paintballs from there to the breech via a tube. Here again, the paintballs are pushed to the breech by those behind them. This series of patents also shows other methods of feeding a paintball gun from below or remotely. All of them feature means of mechanically moving the paintballs.

U.S. Patent 5,771,875 by Sullivan is directed to simulating the look of a real gun as well as reducing the target presented by the gun and magazine assembly. In Sullivan, the hopper
65 magazine is located where the forward stock of a real gun would be. Below the breech, in the

area where a magazine would be, is a housing with a feeder mechanism. The paintballs flow from the hopper magazine to the housing and are fed upward to the breech. To maintain a realistic gun appearance, the breech must be loaded from the bottom. Thus, Sullivan requires a gun made differently from most paintball guns which load from the top half of the barrel. In
70 short, Sullivan is an entirely new type of paintball gun, which uses mechanical means to load from the bottom of the breech.

Two patents that simulate the look of a pistol are U.S. Patents 5,511,333 by Farrell and 6,470,872 B1 by Tiberius et al. Both of these use spring loaded clips which are within the profile of the gun to hold and feed the paintballs. Their gas supplies are located within the profile of the
75 gun as well. In the case of Tiberius, both the paintballs and gas charge are in the handle of the pistol. Farrell has its paintball clip running along the top of the barrel and the gas charge lies along the bottom of the barrel. In both cases the magazine has a limited capacity and the spring introduces undesirable stress on the paintballs.

SUMMARY OF THE INVENTION

80 The present invention is an improved hopper for holding paintballs and feeding them to a paintball gun. The hopper is in communication with the chute leading into the breech of a typical paintball gun and more closely fits to the shape of the rest of the gun than typical paintball hoppers and may be shaped in such a manner as to simulate the overall look of an actual gun. A smaller portion of the hopper is above the breech and runs from a short distance in front of the
85 breech to a point above and just to the rear of the handle and trigger where most paintball guns terminate. From this point another, larger portion of the hopper extends back and slightly downward from the rear of the gun. This section may be shaped to generally imitate the shoulder

stock on a real gun. A one way gate operates between these two sections of the hopper and allows paintballs to flow from the larger, rear section to the smaller, forward section and prevents their return to the rear. The hopper is filled through a port in the rear section.

90 To use the hopper, it is filled through the rear section with the gun is tilted downward.

This allows the paintballs to run down to fill the forward section of the hopper. The gun is fired in a generally horizontal position and the paintballs flow to the breech due to the shape of the bottom of that section and gravity. As the forward section is emptied, it can be re-supplied by

95 tilting the gun downward. Frequently, during the course of playing the game, a paintball gun will be tilted downwards, and the forward section would automatically be re-supplied in those cases.

The one way gate keeps paintballs from flowing back to the rear section of the hopper. In some embodiments, the size of the forward section could be increased and another gate used to control flow between this additional space and the section feeding the breech of the gun. Also, other

100 gates could be utilized in various embodiments. For example, a gate could be placed

immediately behind the breech in the smaller portion of the hopper that is above the breech. This gate would prevent paintballs from running to the back of this smaller portion, when the barrel is elevated significantly above the breech of the gun, such as when aiming up hill.

The previous description of this invention has focused on a hopper added as a retrofit to a
105 previously made gun. It can also be applied to a new gun wherein the hopper is made integral to the body of the gun. This general embodiment of the invention could lead to many particular embodiments depending on the model of real gun being imitated. The forestock would present opportunities for additional capacity as well as any imitation munition clip or an imitation second barrel simulating a gun with over and under barrels, etc. With the inherent advantages of

110 building a gun around this concept from the beginning, it is conceivable that some embodiments would have communication of paintballs from the forestock to the shoulder stock and from there to the portion of the hopper over the breech or other flow paths. Such configurations would have suitable gating to keep the paintballs flowing effectively.

115 Also, individuals playing paintball will sometimes carry tubes of paintballs with them while playing. These are used for rapid refill of the hopper when the original load is used up. Some embodiments of the current invention could have such refill tubes shaped like part of the hopper and made to be quickly interchangeable on the paintball gun. As an example, the shoulder stock portion of the hopper could be removable and interchangeable, allowing a refill to replace an empty shoulder stock. This applies to both new gun designs and hoppers applied after
120 the fact to current popular guns.

A primary objective of this invention is to provide a lower profile hopper for a paintball gun with the hopper closely following the body of the gun.

Another objective of the present invention is to provide this lower profile utilizing a gravity feed method to prevent rupturing the paintballs.

125 Yet another objective of the present invention is to provide a more realistic shape to the paintball gun, simulating assault rifles or other conventional firearms.

Still yet another objective of this invention is to provide a lower stack height of paintballs in the hopper to prevent jams.

A further objective of this invention is to provide a system of interchangeable refills.

130 As discussed above, the article of the present invention overcomes the disadvantages inherent in prior art methods and prior art devices for carrying paintballs and feeding them to a

paintball gun. In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and/or to the arrangement of the support structure set forth in the following 135 description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various and diverse ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purposes of description and should not be regarded as limiting.

Accordingly, those skilled in the art will appreciate that the concept upon which this 140 invention is based may readily be utilized as a basis for the design of other structures, methods, and systems for carrying out the purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

Furthermore, the purpose of the foregoing Abstract is to enable the U.S. Patent and 145 Trademark Office and the public generally, and especially including the practitioners of the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection, the nature and essence of the technical disclosure of the application. The Abstract is neither intended to define the invention of the application, nor is it intended to be limiting to the scope of the invention in any respect.

150 **BRIEF DESCRIPTION OF THE DRAWINGS**

Additional utility and features of this invention will become more fully apparent to those skilled in the art by reference to the following drawings, wherein all components are designated by like numerals and described more specifically.

Fig. 1 is a side view of a prior art paintball gun featuring a prior art paintball hopper

155 mounted thereon.

Fig. 2 is a side view of a current art paintball gun with a paintball hopper of the present invention attached to the gun.

Fig. 3a shows the flow of paintball from the rear chamber of the hopper to the central chamber.

160 Fig. 3b shows the flow of paintballs from the forward chamber of the hopper to the central chamber.

Fig. 4 shows a paintball gun made with the paintball hoppers of the present invention integral to the gun construction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

165 The following discussion illustrates only some of the possible configurations claimed in this invention and should not be interpreted as limiting the scope of the claims.

The present invention is a new hopper configuration for paintball guns. Fig. 1 shows a side view of a prior art paintball gun which has the following: a working section (10) containing the mechanical workings of a paintball gun such as the trigger, the bolt, and valves; a barrel (20) through which the paintballs are propelled; a gas cylinder (30) which supplies pressurized gas to power the gun; and a hopper (40) which stores a quantity of paintballs which are gravity fed into the working section (10) of the paintball gun.

170 Fig. 2 shows the hopper (50) of the preferred embodiment of the current invention placed on the prior art paintball gun shown in Fig. 1. In general, the hopper (50) is shaped to provide the overall look of a real gun. Within the hopper (50) is a central chamber (60) located above the

working portion (10) of the paintball gun. The central chamber's (60) bottom is shaped to direct
180 paintballs contained therein to the working portion (10) of the paintball gun. The paintball gun is
gravity fed. Extending back from the central chamber (60) is a rear chamber (70) appropriately
shaped to resemble a similarly located portion on a real gun such as a shoulder butt. Between the
185 rear chamber (70) and the central chamber (60) is a rear gate (80) which is constructed so as to be
normally gravity actuated, and which allows paintballs to flow from the rear chamber (70) to the
central chamber (60) but not in the other direction. Extending forward from the central chamber
(60) is a forward chamber (90) which conforms to the look of a real gun. Between the forward
chamber (90) and the central chamber (60) is a forward gate (100) which is constructed so as to
be normally gravity actuated, and which allows paintballs to flow from the forward chamber (90)
190 to the central chamber (60) but not in the other direction.

Fig. 3a shows the working of the paintball hopper (50) as the gun is turned with its barrel
(20) toward the ground to refill the central chamber (60). From the force of gravity and the force
of paintballs against it, rear gate (80) opens and allows paintballs to flow from the rear chamber
195 (70) to the central chamber (60). Forward gate (100) remains closed due to gravity and prevents
the paintballs from passing through the central chamber (60) on into the forward chamber (90).
When the gun is returned to a normal, nearly horizontal, position, the paintballs are retained in
the central chamber (60) to be fed into the working portion (10) of the gun.

Fig. 3b shows the working of the paintball hopper (50) to refill the central chamber (60)
195 by lifting the barrel (20) of the gun upward. From the force of gravity and the force of paintballs
against it, the forward gate (100) opens and allows paintballs to flow from the forward chamber
(90) to the central chamber (60). Rear gate (80) remains closed due to gravity and prevents the

paintballs from passing through the central chamber (60) on into the rear chamber (70). When
the gun is returned to a normal, nearly horizontal, position, the paintballs are retained in the
200 central chamber (60) to be fed into the working portion (10) of the paintball gun.

Not depicted in these figures is a means for adding paintballs to the hopper (50). It
should be appreciated by one skilled in the art that there are many locations where an opening
with a closure may be placed on the hopper (50). It should also be appreciated that there are
innumerable configurations for openings with closures that could be applied to the present
205 invention.

Also not depicted in the figures is a means for filling the rear chamber (70) or the forward
chamber (90) when the opening for filling the hopper (50) is not in that chamber. To do this,
means would be provided for manually opening the appropriate gate so that paintballs may flow
into the chamber. For example, if an opening is provided in the rear chamber (70) for filling the
210 hopper (50), the gun would be held barrel down while manually holding forward gate (100) open
so that paintballs flow from the rear chamber (70), past rear gate (80), through the central
chamber (60), past the forward gate (100) and into the forward chamber (90) for storage until the
central chamber (60) needs refilled from the forward chamber (90). Again it should be apparent
that there are a myriad of ways to manually actuate a gate.

215 It is contemplated that in some embodiments a portion of the hopper (50) may be
removable and interchangeable with a like removable portion. For example, in Fig. 2 the rear
chamber (70) may be removably attached to the central chamber (60). A user may carry an extra
rear chamber (70) separate from the hopper (60) and, when needing to add paintballs to the
hopper (60), remove the emptied rear chamber (70) and replace it with a full rear chamber (70).

220 It should be readily apparent that many widely known means for removably joining two chambers would be applicable for such an embodiment. It is also apparent that other chambers in multiple chamber embodiments of this invention would provide similar opportunities for removable chambers used for refills.

225 It is also contemplated that additional gates could be added to the hopper (50), particularly within the central chamber (60), where they may assist in controlling paintballs while the gun is being actively used and improve the flow of paintballs to the working portion of the paintball gun. Additional gates could also be manually operated while filling the hopper (50). All gates discussed may or may not have the capability of being fixed either in the open or closed position.

230 Fig. 4 depicts a paintball gun which is made with the hopper of the present invention built into the structure of the paintball gun. Overall, the appearance of the paintball gun is intended to be that of a real gun. This embodiment can have all of the elements of the previous embodiments such as a central, rear, and forward chambers separated by gates in between the chambers with the gates controlling the flow of the paintballs. The integral construction of the 235 paintball hopper with the rest of the gun provides many opportunities for increasing the size and number of the chambers. The order of connection of the chambers may even be varied. For example, if a chamber is added below the barrel of the paintball gun, it may be more functional to connect this chamber to a chamber in the rear of the gun via a passage through the working portion of the gun. The latter chamber may then be connected to a third chamber located above 240 the working portion of the gun.

It should be noted that all of the figures show a gas cylinder attached to the paintball gun.

It is also possible to connect the gas cylinder to the gun with a gas line several feet long. The cylinder can then be carried elsewhere on the user's person and the gun's bulk is decreased. This would have no effect on the present invention.